

Appl. No. 10/034,680
Docket No. 14X200155/GEM-0194
Reply to Office communication of 11/12/2004
Amendment dated 02/11/2005

AMENDMENTS TO THE SPECIFICATION

Beginning on page 2, please amend paragraph [0009] as follows:

[0009] Figure 3 shows diagrammatically other images displayed in accordance with an embodiment of the invention;

Beginning on page 3, please amend paragraph [0014] as follows:

[0014] Figure 1 shows diagrammatically images 2 and 4 of both breasts displayed in a known apparatus. The first image 2 shows the right-hand breast of a patient in a cranio-caudal view. The second image 4 shows the patient's left-hand breast in a cranio-caudal view. Both images are displayed side by side, the first image being to the left of the second image. The respective contours 6 and 8 of the breasts are shown diagrammatically on their images 2 and 4. On the images 2 and 4, regions of interest 10 and 12 defined around the breasts can also be seen. As explained above, each region of interest is formed by a rectangle surrounding the breast. This rectangle has, taking into account a margin surrounding the breast, a small as possible surface area. ~~In of Figure 1~~ In Figure 1, the views of the breasts on the first and second images are ~~offset~~, offset. The right-hand breast shown on the first image is higher up than the view of the left-hand breast on the second image. The "height" dimension with reference to Figure 1 as well as to the remaining drawings refers to a dimension on the images taken along their adjacent edge. Because of the offset, it is difficult for the practitioner to compare the two images. The offset can simply originate from the manner in which each breast was positioned when the images were taken. The offset can also originate from a difference in size of the two breasts.

Appln. No. 10/034,680
Docket No. 14XZ00155/GEM-0194
Reply to Office communication of 11/12/2004
Amendment dated 02/11/2005

Beginning on page 4, please amend paragraph [0016] as follows:

[0016] The display shown in FIG. 2 can be obtained as follows. Images of both breasts are acquired. ~~As~~ As explained above, these may originate directly from apparatus fitted with a digital acquisition unit, or from a unit for digitizing analog images. A region of interest is defined on each image around the view of the patient's breast on the image. Definition of such a region of interest is described in the following European patent applications: EP-A-1,047,018, EP-A-1,035,507 or EP-A-0, 912,963. Definition of such a region of interest is performed on the image using digital image processing techniques. Once the region of interest has been defined on each image, the images are displayed so that the regions of interest are aligned. As Figure 2 shows, for regions of interest of the same size in the vertical direction, alignment is performed by displaying the upper or lower edge of the regions of interest of the images at the same height.

Beginning on page 4, please amend paragraph [0018] as follows:

[0018] Figure 3 shows diagrammatically other images displayed according to an embodiment of the invention. The images on Figure 3 are side view images of a patient's breasts in a mammograph; the same reference numerals have been employed. Figure 3 shows that the breast shown in the first image 2, to the left of the figure, is larger than the view of the breast on the second image 4 of Figure 3. This size difference can simply originate from differing manipulations when taking the images. In the embodiment of Figure 3, the right-hand breast may have been positioned differently from the left-hand breast when the images were taken. Two ~~arrows 12~~ arrows 16 and 14 can also be seen on the images 2 and 4 and these indicate the respective positions of the tip of the breast on each image. In the embodiment of Figure 3, the position of the tip of the breast is used for aligning the regions of interest on the two images. The position of the tip of the breast can be determined using known image analysis techniques. For the alignment, the height in the image of this tip of the breast can simply be used. More

Appln. No. 10/034,680
Docket No. 14X200155/GEM-0194
Reply to Office communication of 11/12/2004
Amendment dated 02/11/2005

generally, where the regions of interest of both images are not of the same size in the vertical direction, one can, for alignment purposes, optimize one image-dependent criterion, as a function of the relative height of the images. Such a criterion can be the result of computing correlation over the whole of the region of interest, or over a part of this region of interest. One could also proceed to correlate images in the area adjoining the tip of the breast. One could also proceed to align the contour of a breast or part of the contour of one breast with respect to the other breast. Such computations allow determination of the relative height for which this criterion is at its maximum; this height now corresponds to alignment of the regions of interest on both images. The result, shown in Figure 3, is that the images are, like in Figure 2, displayed so as to facilitate their comparison. The technique described with reference to Figure 3 is particularly useful when the regions of interest determined for the two images are not of the same size. They are now aligned by calculating an optimization criterion which depends on the relative position of the images, after which this criterion is optimized.

Beginning on page 6, please amend paragraph [0021] as follows:

[0021] Response at steps 22 and 23 can be pre-programmed for a given display protocol or can result from user input. At step 24, a magnification factor is calculated. This factor is a minimum of the ratio between image size and region of interest size. The minimum on both images, in both directions is considered. The magnification factor obtained will ensure that the region of interest of each image is wholly contained within the enlarged image. At the next step 26, each image is enlarged by applying the calculated magnification factor. Control then passes to step 28 where the two regions of interest are aligned. ~~At step 13~~ At step 30, both images are displayed with their regions of interest aligned. The process then stops at step 32. It can obviously be repeated for other images.

Appl. No. 10/034,680
Docket No. 14X200155/GEM-0194
Reply to Office communication of 11/12/2004
Amendment dated 02/11/2005

Beginning on page 7, please amend paragraph [0022] as follows:

[0022] Figure 6 shows image display apparatus. The apparatus has a unit for acquiring digital images 34. This unit is for example an image sensor of digital apparatus, or a unit for digitizing analog images or, yet again, a unit for receiving storage media containing a digital image. The acquisition unit could also be simply comprised of storage media such as a hard disk. The acquisition unit supplies an image processing unit 36 with at least two digital images intended for simultaneous display. Image processing unit 36 processes the images and applies the processed images to a display device 38. As explained above, the display device can be of any type whatsoever. Image processing unit 36 can consist of a PC (personal computer), an image processing board including a microprocessor, or any other digital computing means known per se. This image processing unit comprises several separate processing blocks. These blocks are for example logic blocks in the processing unit. The first block 40 is responsible for defining a region of interest and defines, in each image received, a region of interest and outputs an image having a region of interest. The images supplied are fed to block 42 for enlargement. ~~At block 32~~ Block 42 a common magnification factor for the images is calculated; the images are then enlarged. The enlarged images are applied to block 44 handling alignment. As arrow 46 shows, the images with their region of interest can be applied directly to alignment block 44, bypassing the magnification block. In the alignment block, the regions of interest of the images are aligned. The output is aligned images which are applied to display device 38 for simultaneous display. This diagram does not show processing operations which may be applied to the images but which have no bearing on the method described.